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Abstract

In this paper we present AulaNet, an environment for creating, updating and attending Web-based courses. Here, we illustrate some dynamics of three experiments of course development and delivery with AulaNet, pointing out their features, discussing how easy and how difficult is to orchestrate technology for educational purposes.

Introduction

Advances in education technology, coupled with changes in society, are creating new paradigms for education (Khan 1997). Participants in this new educational paradigm require rich learning environments supported by well-designed resources (Reigeluth and Khan 1994). The Web can be used to provide opportunities to develop active and customized learning experiences. One of the great values of the Internet, and in particular of the Web, is that it brings the learner face to face with an ever-expanding universe of digital information (Eales and Byrd 1997).

Web-based education (WBE) is an innovative approach to delivering instruction using the Web as a medium. A WBE learning environment should include many resources, support cooperation, implement Web-based activities as part of learning framework, and support both novices and experts (Sherry and Wilson 1997). To do this much, a variety of technologies is being used to implement sophisticated WBE environments in order to replace or supplement the face-to-face classroom, including hypertext classes, video and audio conferencing, video streaming, etc. However, designing and delivering instruction on the Web requires thoughtful analysis and investigation of how to use the Web's potential in concert with instructional principles (Ritchie and Hoffman 1997).

AulaNet is a groupware learning environment based on the Web for creating and attending distance courses. The objectives of AulaNet are to adopt the Web as an educational environment; to foster a workable transition from conventional classrooms to virtual classrooms, giving the opportunity to reuse existing educational material; and to create knowledge communities (Lucena et. al. 1998). AulaNet differs from the majority of digital learning environments available because it is based on a groupware approach while most of the other related environments virtualizes the traditional school physical metaphors: corridors, blackboards, general office, classrooms, library, etc. In addition, AulaNet makes a clear distinction between content and navigation. The teacher's task is to create good quality instructional material, leaving the Internet navigation programming to the environment.

AulaNet offers a set of communication, coordination and cooperation mechanisms, so that the teacher can customize his course according to the intended goals of the learning process. The communication mechanisms provide the means for communication between teacher and learner and among learners. The coordination mechanisms provide the means for scheduling tasks and assessment. Finally, the cooperation mechanisms provide the means for content material input and for cooperative task execution, such as indicating other teachers to co-author the course and allowing student contributions.

In this work we present three experiments of courses delivered using this environment, relating the strategies and technologies used to develop these courses and the mechanics of their delivering, in order to discuss their effectiveness for both teachers and students.

Course 1

The Financial Calculus course is given for undergraduate students of the Administration Institute. Since this is a regular course, it already had certified paper-based materials, such as textbooks, student notebooks, exams from previous terms, references, etc. All this previously existing material allowed the teacher to completely set up the Web course before making it available. In the beginning of term, the Administration faculty made a student pre-enrollment process, creating a small closed group all along the course term (≈ 20 participants) who could be at a classroom.

The teacher's approach to offering the course was the simplest, turning the previous materials into digital media and put them in the course. The students' learning process was basically a self-directed, just-in-time learning. There

was a high level of individualization, so that each student learnt just what he/she wants at the time he/she needed. The course did not make the learning a social process, just individual. The students went to the course site, took a look at the available materials and directed their questions only to the teacher using e-mail. All the learning assessment was done in the traditional paper based way. The teacher played the role of a monitor, just answering the students questions, correcting the paper exams and giving grades.

Comparing the effort cost of developing this course with developing the face-to-face course given before, they are very alike, not to say the same. No additional demand was required from the faculty and the teacher, except for the fact that it was necessary to digitize the previous material. Besides, the course did not use any expensive technology, such as audio and video. The teacher provided almost the same feedback for the students that he would have provided in a classroom.

Course 2

The Evaluation of the Web Information Quality course was given for an audience composed of teachers of all learning levels sponsored by a commercial consulting enterprise. This course has never been given before and the enterprise did not have any previous material for it. The teacher chose to make a pre-course discussion with participants who were interested in attending it, creating a little big group (≈ 40 participants).

Since there was no previous certified material for the course and the purpose of the course was to debate over information quality, the teacher chose an approach of group discussion (computer-mediated-communication, CMC). The idea was to let the discussion take place, and at the end the students, divided into small groups, would create some material. This material would be used for informal assessment of these students and also as certified material for next versions of this course. The learning process was cooperative with intense participation of the students during the course. There was great interaction. The teacher played the role of an animator, trying not to simply lead the discussion, but to call every student to participate. However, all this participation created a communication overload.

Comparing the costs of this course with a face-to-face one using the same approach, they would seem to be very alike. The teacher did not have to prepare any previous material, but the cost of providing feedback to the students was much greater. In a face-to-face classroom, the teacher would have the power to interrupt the discussion, make comments and avoid the communication overload.

Course 3

The Information Technology Applied to Education course is given for graduate students of the Computer Science Department offered by teachers of the AulaNet Team. In fact, this course was in its second version, and had some digital certified materials from its first version. The teachers agreed to let any interested participant attend it and they also allowed students to enroll in the middle of the course. Since it had no acceptance restrictions, there was an enormous group of students (over 200).

The course had some certified material which was put in before it was offered, including: texts (for lectures), slides, video recorded with the teachers, papers (which were turn into digital in html format), and messages from previous discussions. The teachers adopted a very specific logistic: (1) the course had its contents divided into major topics; (2) each week the students had to take a look over the material of a topic; (3) they should debate this topic using the discussion group; (4) at the end of the week, one of the teachers mediated a chat about this topic. After the discussion had taken place, some tasks were assigned to the students in the format of works (assessment) and the five most "interesting" topics generated newsgroups, for more detailed discussion. It is important to say that this logistic did not prevent students from communicating with each other, taking a look at the materials of other topics or discussing other subjects than the topic of the week.

There was great student participation, creating a social group learning process, with the teachers facilitating the social interaction. Nonetheless, the size of the group allowed the creation of observers, students who did not actively participate, they just followed the discussion passively. Another problem faced was the realization of the chats. Many students could not be on the environment at the right time and the actual number of participants was always very small (≈ 10 participants).

Comparing the cost of this course with a face-to-face course, it was very expensive and time consuming. It was necessary to record video presentations, to prepare new material, to answer student questions, to animate the asynchronous discussions at a reasonable time, to animate the chats, and so on. The teachers also had to provide constant feedback for the students. This demanded a backstage group to help the teachers and some infrastructure.

Some Analisys

From the experiments, we can see that the size of the group has an important role. Although participants learn through peer communication, intensive interaction with a great number of peers may create some coordination troubles, such as, hyper-space disorientation,

communication overload, task group disorientation, and lack of subgroup synchronism. The greater the group size is, the more these problems affect the learning process, lowering the richness of participants' contributions, leading to misunderstandings and to disinterest.

We also saw the cost of delivering Web-based courses. The total cost computed in this work relies on the teachers' time consumption to prepare materials and to follow the learning process, the faculty demands on infrastructure and personnel, and the management of other little problems, such as scheduling a synchronous activity of inviting other teachers to participate in discussions. For comparison effects, course 1 was the less expensive since its teacher just put the existing materials in the Web. Course 3 was the most expensive since it tried to use almost all the capabilities provided by the Web-based learning environment.

As mentioned above, the cost is related to time implications. The more one course demanded from the teacher and the faculty, the more it took to prepare it. The teachers of courses 1 and 3 needed to begin preparing their courses a little before the semester actually had begun.

In fact, the cost of these courses will tend to diminish, since the core materials will not need to be all changed, but to have little maintenance. This is compensation to the faculty members, because it can re-use these already digitized materials in other courses, or to create more classes for a course.

Other finding is related to the learners' previous experience with Web-based learning environments. None of the students who participated in the three courses shown had any previous experience with WBE environments, but those who had some experience in using Internet tools, such as chats, newsgroups, search engines, participated more and most of the time tried to raise the level of the discussion. We could not say for sure if those who had made fewer contributions acted that way due to shyness, for instance, or to inexperience. It is important that the students have some previous experience using these sorts of tools to enrich the learning process.

Assessment is another incipient field on Web-based learning. In all the courses shown, learning was measured using paper-based exams or tasks, just like in the traditional courses. Courses 2 and 3 tried to measure learning through learner participation and interest, but these are two unreliable parameters, since they are not valuable to measure the quality of these contributions.

The study did not make a direct measure of the students' satisfaction on using AulaNet to take these courses. But it is important to mention that some of the students, who participated in course 3, developed courses with AulaNet in the following semester.

Conclusion

In this paper we have briefly described AulaNet, an environment for creating, updating and attending of Web-based courses. We have presented three experiments of courses developed and delivered with AulaNet, pointing their features and difficulties. Our goal with this study was to point out the cost of web-based courses, the extra demands it imposes, the feedback the students will require, etc. Ideally, all these features should be considered before creating a distance course, but it is not always possible.

References

Choren, R., Blois, M. and Fuks, H. "Quest: An Assessment Tool for Web-based Education", *WebNet'98—World Conference of the WWW, Internet & Intranet*, 1998, Association for the Advancement of Computing in Education, Charlottesville, VA, 1998.

Eales, R. T. J. and Byrd, L. M. "Virtual deschooling society: Authentic collaborative learning via the Internet", *WebNet'97—World Conference of the WWW, Internet & Intranet*, 1997, Association for the Advancement of Computing in Education, Charlottesville, VA, 1997, 155-160.

Khan, B. H. "Web-based instruction (WBI): what is it and why is it?", in *Web-based instruction*, Khan, B. H.(eds.), Englewood Cliffs, NJ, 1997, 5-18.

Lucena, C. J. P., Fuks, H., Milidiú, R., Laufer, C., Blois, M., Choren, R., Torres, V. and Daflon, L. "AulaNet: Helping Teachers to Do Their Homework", *Multimedia Computer Techniques in Engineering Education Workshop*, Technische Universitat Graz, Graz, Austria, 1998, 16-30.

Reigeluth, C. M. and Khan, B. H. "Do instructional systems design (ISD) and educational systems design (ESD) really need each other?", *Annual Meeting of the Association for Educational Communications and Technology*, AECT, Nashville, TN, 1994.

Ritchie, D. C. and Hoffman, B. "Incorporating instructional design principles with the World Wide Web", in *Web-based instruction*, Khan, B. H. (eds.), Englewood Cliffs, NJ, 1997, 135-138.

Sherry, L. and Wilson, B. "Transformative communication as a stimulus to web innovations", in *Web-based instruction*, Khan, B. H. (eds.), Englewood Cliffs, NJ, 1997, 67-74.